Head in the Clouds...

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EarthEnv.org

Building a (near) global 1km dataset of...

- Land Surface Temperature (LST)
- Temperature (using LST)
- Clouds
- Precipitation (using Clouds)
- Topography (and related metrics)
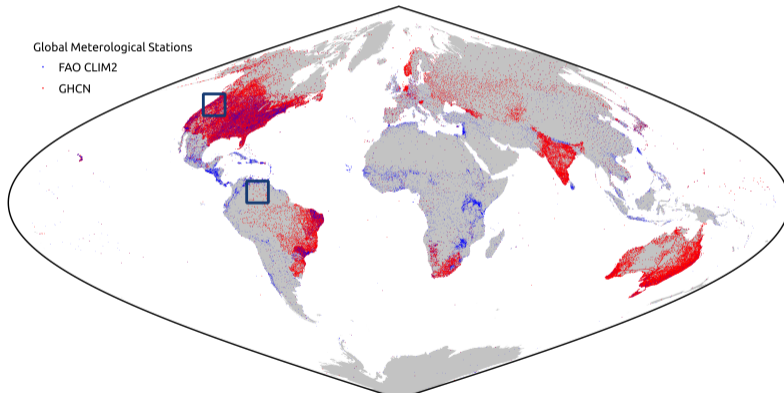
NASA, NCEAS, ...

Cloud Climatology

Clouds vital for:

- Global energy balance, latent heat flux, radiation flux (Stephens and Kummerow, 2007)
- Ecosystem Productivity (Fischer et al., 2009; Graham et al., 2003; Williams et al., 2008)
- Eco-physiology, such as activity patterns of ectotherms (Hare and Cree, 2010)
- Evapotranspiration and water loss in animals and plants
- Behavior and light availability: Clouds affecting predation exposure and foraging behavior of nocturnal animals
- Precipitation (Stephens and Kummerow, 2007)

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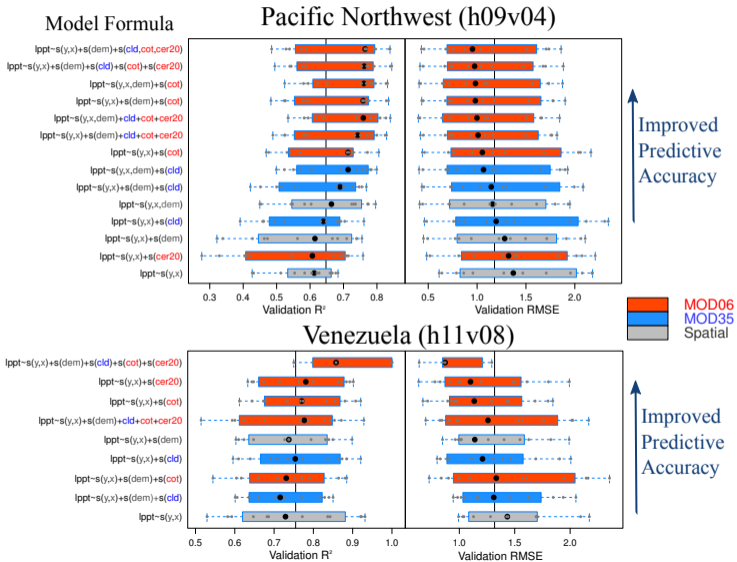- Precipitation (Stephens and Kummerow, 2007)

Often ignored in biogeography

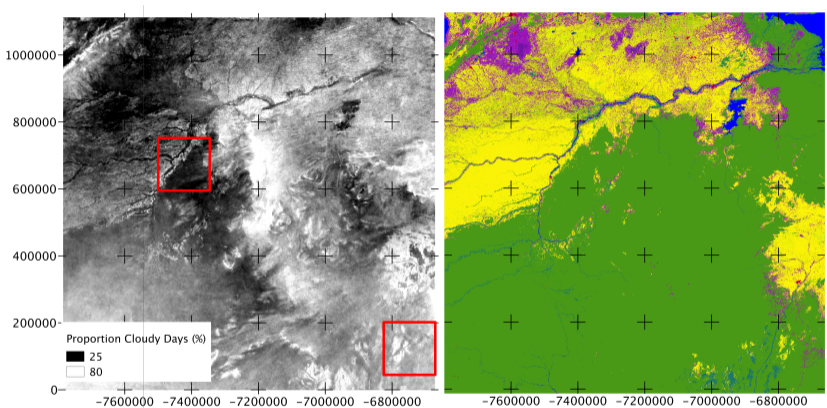# Improving Interpolation of Precipitation using Cloud Data[1]

Global Meterological Stations
· FAO CLIM2
· GHCN

Improving Interpolation of Precipitation using Cloud Data[1]

Model Formula

Pacific Northwest (h09v04)

Venezuela (h11v08)

MOD06
MOD35
Spatial

Improved Predictive Accuracy

MODIS Cloud Mask Landcover Bias (Venezuela)

Legend

MCD12Q1_IGBP_2005_v51

- Water
- Evergreen Needleleaf forest
- Evergreen Broadleaf forest
- Deciduous Needleleaf forest
- Deciduous Broadleaf forest
- Mixed forest
- Closed shrublands
- Open shrublands
- Woody savannas
- Savannas
- Grasslands
- Permanent wetlands
- Croplands
- Urban and built-up
- Cropland/Natural vegetation mosaic
- Snow and ice
- Barren or sparsely vegetated
- Unclassified
- Fill

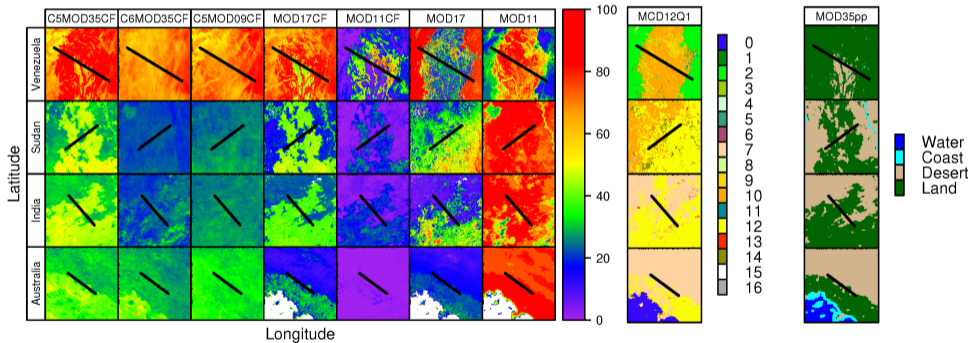# MODIS Cloud Mask Landcover Bias (Venezuela)

Legend

CLD0
- ■ 25
- □ 80

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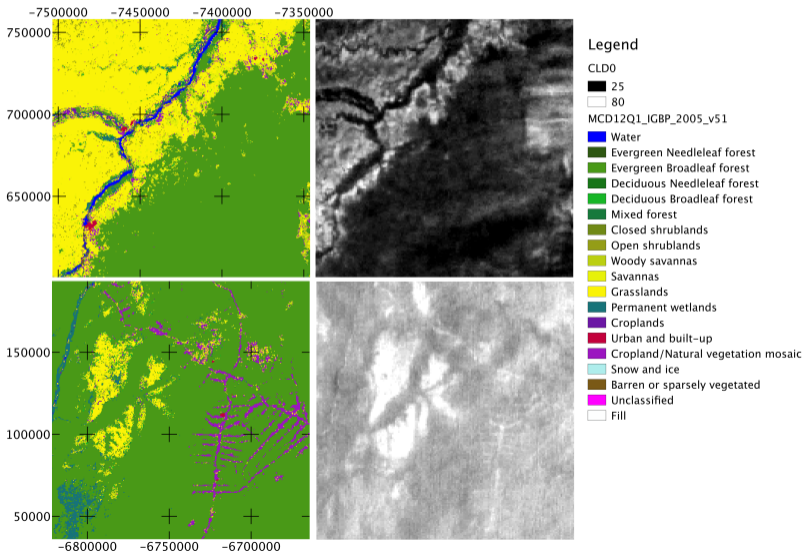
Systematic landcover bias in Collection 5 MODIS cloud mask and derived products [2]
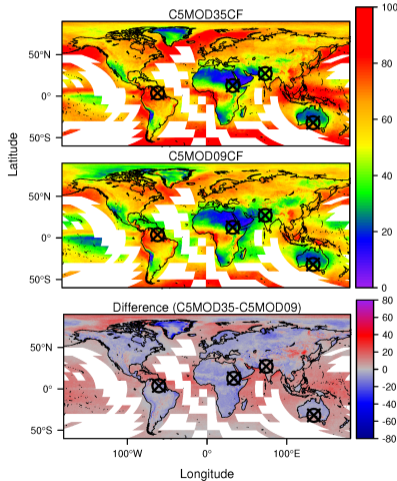
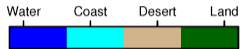[2] Remote Sensing of Environment (in press)

Systematic landcover bias in Collection 5 MODIS cloud mask and derived products [2]

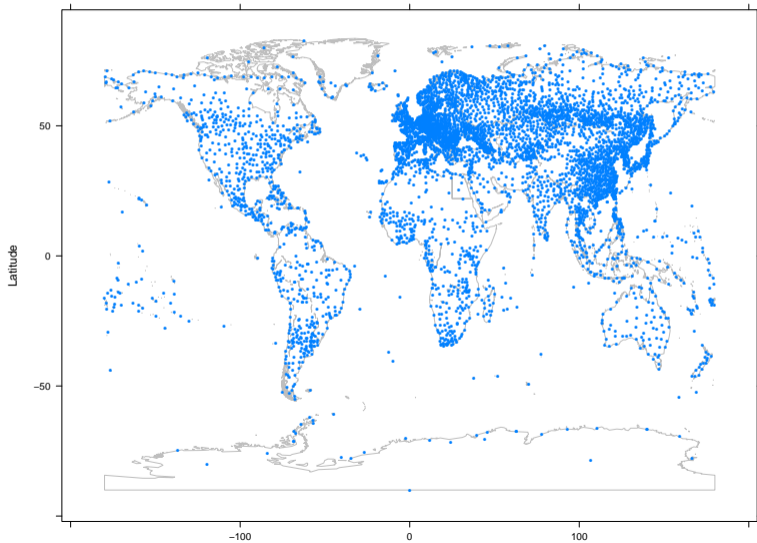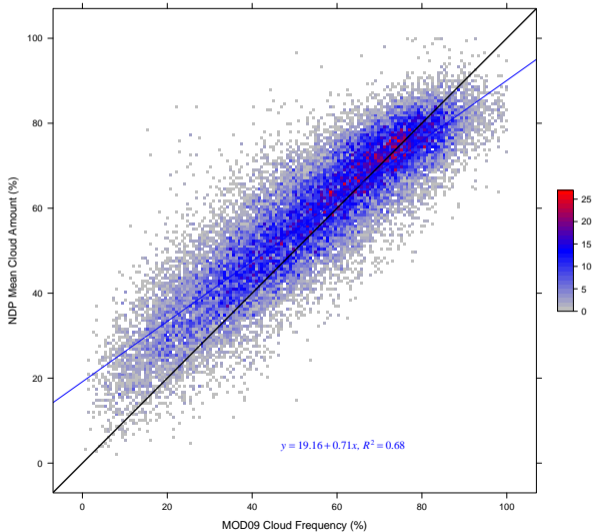# Systematic landcover bias in Collection 5 MODIS cloud mask and derived products [2]
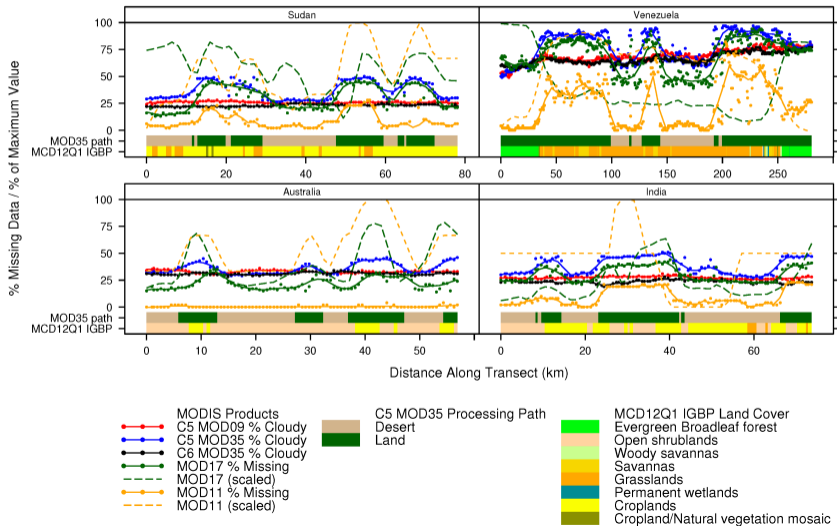
Systematic landcover bias in Collection 5 MODIS cloud mask and derived products [2]
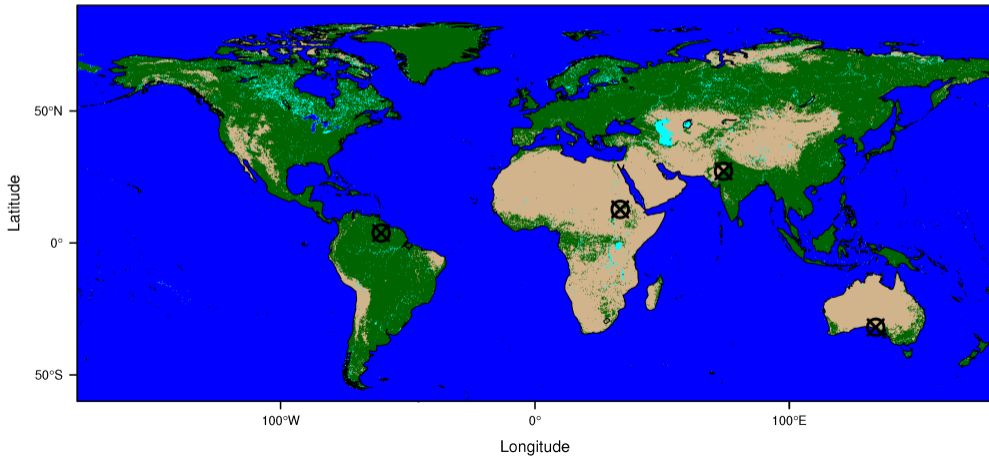
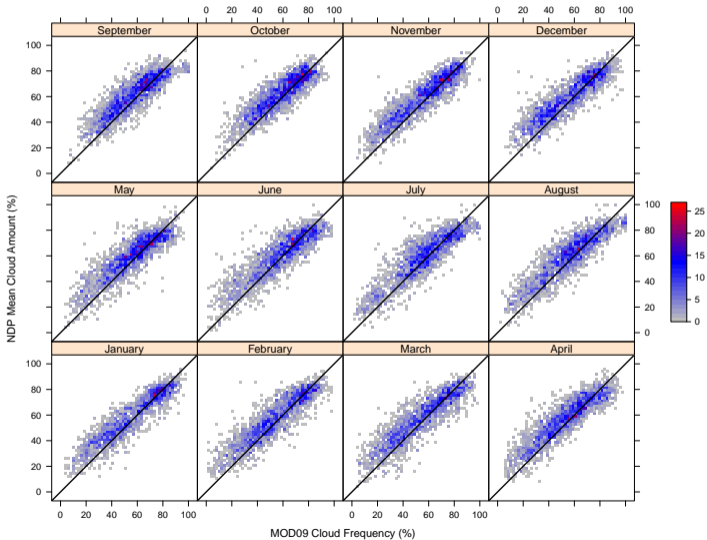## MOD09 Cloud Mask (bit 10 in the first QA byte)

Validation
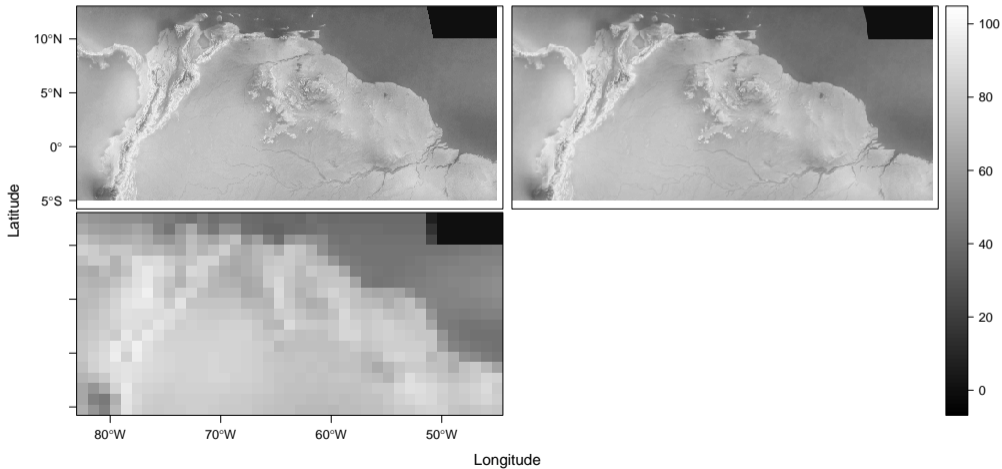
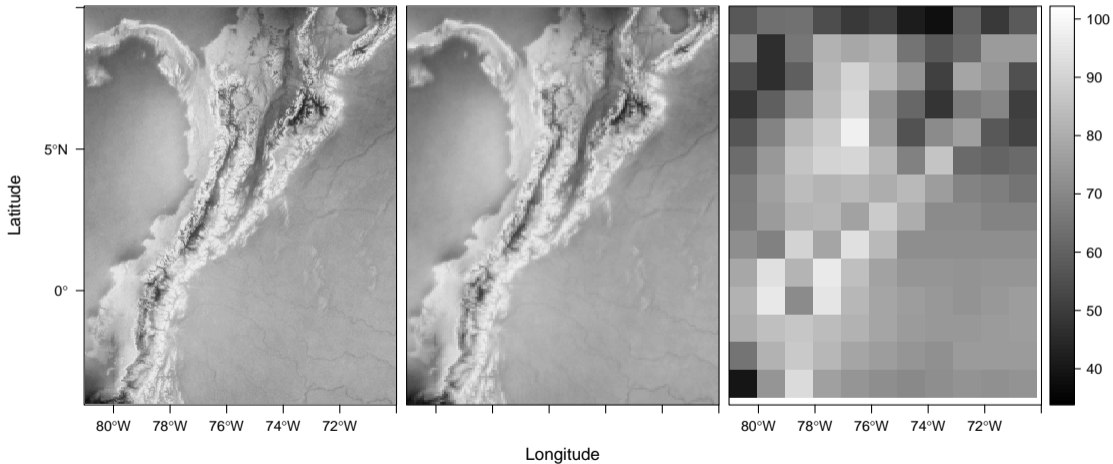**NDP−026D Cloud Climatology Stations**

Validation

Validation
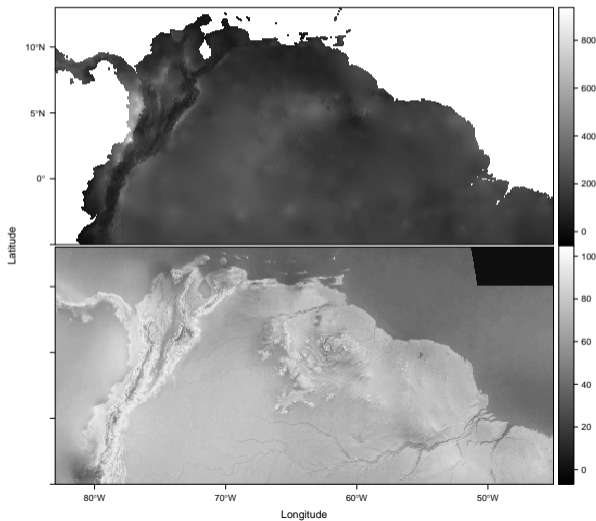
Resolution Matters (1km, 8km, 110 km)
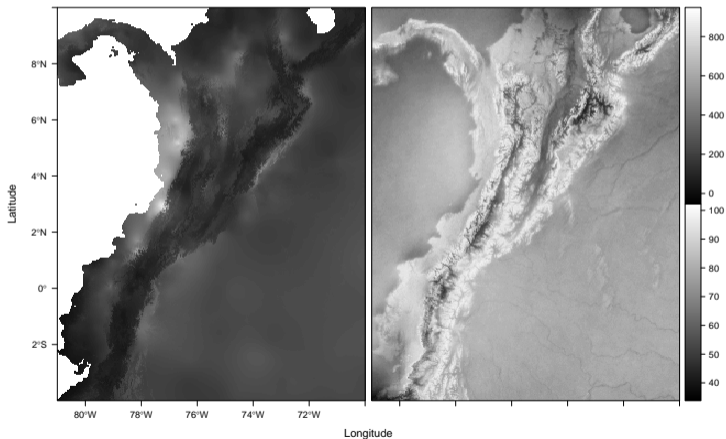
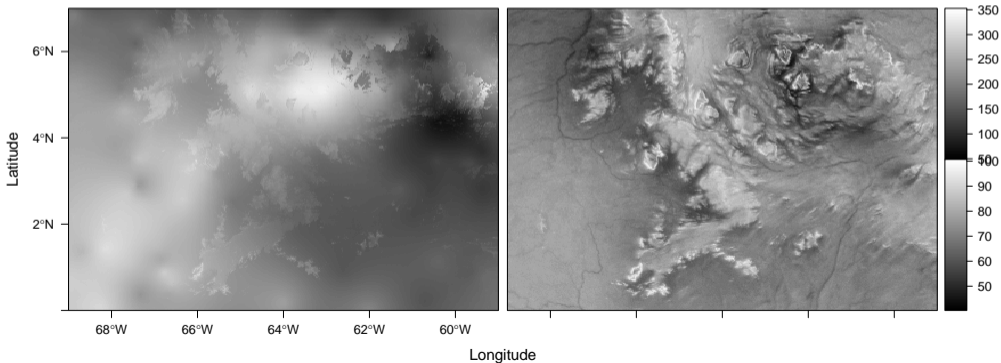## Resolution Matters (1km, 8km, 110 km)

Resolution $\neq$ Realism

Comparison of Cloud Cover and WorldClim Mean Annual Precipitation

Resolution $\neq$ Realism

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Resolution $\neq$ Realism

Comparison of Cloud Cover and WorldClim Mean Annual Precipitation

Validation & Final Products

Validation

- Spatial Residuals
- Landcover biases
- Latitudinal Gradient

Final Products

- Annual mean
- Monthly means + SDs
- Variability among and within years